

3 August 1971

Alternates 2 & 3 req'd for acceptance.  
No shipping tables until above satisfactory.

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AT

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rejection

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C-0239/DI-8 E

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rejection of above

24 Mar 71

rejection

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MLT-3164-L-5922

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rebuttal to

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undated draft  
document

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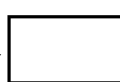
Declass review by NGA/DoD

Alternative 1

156

Replaces x-y contact card only - no other circuit changes - retains relays from present cards

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requires a comparatively simple change:

- a. no adv. eng.
- b. low assy hours
- c. low q.c. and prod. plan. time

- 1- Is 80 hrs (10 days) of engineering really required?
- 2- Would it really take the elec. assy person all day (8 hrs) to rewire the card.
- 3- The prod. tech. assy person is lethargic to say the least - does he take all day to pull the old card out and replace it with the new one.

- 4- The proj. admin. seems to be useful on alternatives 1 and 3, which are simpler than alternate 2, but he is not required in alternate 2.
- 5- Even with using relay from the replaced card, total direct material is   or approx.  $2\frac{1}{4}\%$  of the total cost of a   table. These are expensive boards.

$$\frac{2392}{25} = 96 \text{ ea } 1\frac{1}{4}\%$$

$$\frac{8800}{100} = 88 \quad 1.17$$

$$\frac{12705}{150} = 85 \quad 1.13$$

$$\frac{16500}{200} = 83 \quad 1.10$$

- 6- for those shipping costs of \$2 ea. they should come by air express, at least, particularly since alternate 2 costs \$3.48 ea to ship a more involved fix.

Alternate 2

DIA

Adds drive sprockets and shaft supports to the chain driving the bridge - relocate fail-safe clutch - eliminates present sprocket and chain drive. Adds velocity sensing tachometers to x and y bridge motions - rewiring - replaces present x-y control card. Turn switch replaces trim tab button.

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☐ considers this a substantial electrical problem:

- a. 438 hrs total of adv. eng.
- b. 120 hrs engineering
- c. 120 hrs eng. support
- d. 56 hrs elec assay vs. 8 mech.
- e. ☐ material in spare system alone

AT

- 1- A total of 438 hours, or 11 work weeks, effort of adv. eng. delivery begins in 14 weeks. This is full time employment of one high priced man.
- 2-  $\frac{736 + 52}{46} = 17$  hrs each to assemble.
- 3- In alternate 1, replacing the key control board costs  in material<sup>ST</sup> plus whatever two relays cost say a total of \$ each. Mat'l in alternate <sup>ST</sup>
- 4- Shipping =  $\frac{160}{46} = \$3.48$  ea
- 5- fabrication time vs. mat'l costs other than control board costs  doesn't seem realistic.

Alternate 3

DIA

Add pinch lock on chain  
manually operated by lever  
handles - lock-out switch.

AT

☐ considers this a technically  
complicated problem but simple  
in execution once problem is  
solved:

- a. 145 hrs. of adv. eng.
- b. 36 hrs. eng. support
- c. 8 hrs. prod. eng.
- d. Small fabrication & assay time

- 1- from description this is a rather  
simple mechanical problem and  
145 hrs of adv. eng. is grossly  
excessive.
- 2- Shipping charges of \$2.17 ea for  
a very few number of parts.

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3.3 Specifications

MLT-1540-4 Light Tables which have been modified for a mensuration capability will meet the following specifications with any specified optical instruments mounted. The following Spec Nos. 1-9 and 12-14 are to be met with the optics carriage in the motorized drive/locked mode.

1. X-Y minimum starting and operating speed 0.005 in./sec.  $\pm$  10%
2. X-Y maximum speed  $>$  .250 in./sec.
3. Time to attain set speed 0.5 to 1.0 sec. or less
4. Time from release of control to stop 0.1 sec. or less
5. Speed of X travel of bridge equal to speed of Y travel of bridge within 10%.
6. For any setting of the speed control, the time for an increment equivalent to 0.2 seconds of motion at that nominal speed setting shall not vary from the time for the previous increment by more than  $\pm$  5%.
7. Control of carriage speed by speed control shall be approximately logarithmic with slow response at low speed.
8. X-Y speed control shall have no dead band, i.e., minimum speed shall occur at minimum setting of control.
9. X-Y direction switch shall be lever actuated.
10. Movement of microscope carriage and mount when electrically locked in

X and Y within the following limitations:

<u>Pressure Applied</u>	<u>Allowable Movement</u>
2 lbs.	.010"
4 lbs.	.020"

Measurement method is as follows:

- A specified force applied in plus direction
  - Deflection gage zeroed with force applied
  - Specified force applied in minus direction
  - Deflection read with minus force applied
11. Force for manual movement of carriage in X and Y directions will be as low as possible commensurate with the above requirements not exceeding 4 pounds.

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12. At any selected setting of the speed control the variation from that speed shall not exceed  $\pm 20\%$  of that speed.
13. It shall be possible to electrically drive the carriage in X and/or Y when the X and Y locks are engaged. Stopping and starting in both X and Y shall not involve engagement or disengagement of clutches.
14. It is required that an operator be able to electrically "nudge" the carriage to allow final pointing of an object. ☐ demonstrated equipment in July 1971 *(at Rosslyn)* capable of operator induced electrical movement of approximately .0005". Such movement assumes maximum quick off-on response by the operator. It is the intent of both parties that the completed table will function in this regard equal to the above demonstration.

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#### 4.0 ALTERNATE THREE - Y BRIDGE DRIVE DISCONNECT

##### 4.1 Approach

Present MLT-1540 specifications require a force of less than 4 lbs. for manual movement of the microscope bridge and carriage. For manual scanning it is desired to have a force of less than 2 lbs. Present MLT-1540 Light Tables require a force of less than 2 lbs. for movement of the microscope in the X direction, however forces approaching 4 lbs. are required for Y. By disconnecting the bridge from the Y drive chain, forces of less than 2 lbs. for bridge movement can be achieved. This proposed modification will provide for manually disconnecting the Y bridge drive chains. In addition, interlock switches will be provided so that the tilt motor may not be operated when the bridge is disconnected from the chains. It should be noted that there is no automatic fail safe feature and if the bridge drive is disconnected when the bridge is in a tilted position the bridge may fall. Suitable caution signs will be provided.

##### 4.2 Modification Description

The Y drive chain disconnect mechanism will consist of a lever actuated over center cam with a spring loaded return. The cam will actuate a pair of parallel rods



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connected together at the ends by tie bars. When in the locked position the end piece of the rods is forced against the chain by the eccentric cam located at the opposite end of the rods. In the unlocked position the end piece is moved away from the chain allowing free movement. The over center cam is manually operated by a handle that rotates from the vertical down position (unlock) to a position parallel with the MLT table top (locked).

A limit switch will operate in conjunction with the over center cam. When the cam has been rotated up into the lock position the limit switch is activated so that the tilt motor is energized. In the unlock position the tilt motor is disabled. This assures the tilt motor will not operate when the Y drive chain is unlocked.

#### 4.3 Specifications

- Bridge may be freed in Y by lever actuated disconnect
- Manual force required to move Y bridge when freed 1 1/2 lbs.  $\pm$  1/2 lb.
- Manual force required to move X bridge 1 1/2 lbs.  $\pm$  1/2 lb.
- Interlock provided to disable tilt motor when drive is disconnected.

#### 5.0 STATEMENT OF WORK

##### 5.1 Alternate One

In providing the modification proposed in Section 2.0 of this proposal

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will:

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1. Provide printed circuit boards without relays which will contain the necessary circuitry for performance of the MLT-1540 in accordance with specifications listed in Paragraph 2.3.
2. Install and checkout each of the modifications.
3. Revise present ATP to include new features.
4. Begin delivery within 12 weeks after receipt of order.

##### 5.2 Alternate Two

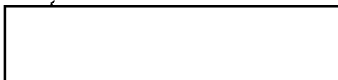
In providing the modifications listed in Section 3.0 of this proposal

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will:

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1. Provide a modification kit to modify the MLT 1540-4 for performance in accordance with the specifications listed in paragraph 3.3.
2. Install and check out each modification. (20 field; 26 factory)
3. Revise present ATP to include new features.
4. Begin delivery within 12 weeks after receipt of order.

5.3 Alternate Three

In providing the modification listed in Section 4.0 of this proposal will:

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1. Provide a modification to modify the MLT-1540 in accordance with Section 4.0.
2. Install and check out each modification. (20 field; 26 factory)
3. Revise present ATP to include new features.
4. Begin delivery within 12 weeks after receipt of order.

6.0 TERMS AND CONDITIONS

The terms and conditions of this proposal shall be as mutually agreed upon

under

7.0 PRICING

Based on a firm fixed price supply type contract, prices for the modifications described in this proposal in accordance with the Statement of Work, Section 5.0, and Terms and Conditions, Section 6.0, are:

Alternate 1

Quantity 25  
100  
150  
200

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Alternate 2

Quantity 46  
Y drive point modification  
Drive electronics modifications

Alternate 3

Quantity 46

